2003P88060US
(2436-187)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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| In re Application of | ) | **BEFORE THE BOARD OF PATENT** |
| | ) | **APPEALS AND INTERFERENCES** |
| Mehmet AYKAC et al. | ) | |
| | ) | Appeal No.: |
| Serial No. 10/680,015 | ) | |
| | ) | Examiner: Tony Ko |
| Filed: October 7, 2003 | ) | |
| | ) | Group Art Unit: 2878 |
| For: DETECTOR ARRAY USING A | ) | |
| CONTINUOUS LIGHT GUIDE | ) | October 4, 2006 |

## BRIEF ON APPEAL

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

This is an appeal from the final rejection of claims 1-16 and 18-20 of the above-identified application, which claims were finally rejected in the Office action dated May 4, 2006. A Notice of Appeal was timely filed on August 4, 2006.

## REAL PARTY IN INTEREST

The real party in interest in this case is Siemens Medical Solutions USA, Inc. of Malvern, PA.

## RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences, which would have any direct or indirect affect on the Board's decision in the present appeal.

## STATUS OF THE CLAIMS

Claims 1-16 and 18-20 are pending in the application. Claim17 has been cancelled. Claims 1-16 and 18-20 stand finally rejected. Claims 1 and 15 constitute the independent claims on appeal. This appeal is directed to claims 1-16 and 18-20.

## STATUS OF AMENDMENTS

No proposed amendment after final has been filed in this application.

## SUMMARY OF THE CLAIMED SUBJECT MATTER

The present invention relates generally to the field of nuclear medical imaging and more particularly to a detector array for use with an imaging device. Such detector arrays interact with a photon such as a gamma ray, X-ray, etc. to produce a flash of visible light that is converted to an electrical signal representation for later reconstruction as a medical image of a patient being imaged. An example of the invention claimed in claim 1 is disclosed in Figs. 1-3, wherein a plurality of arrays **12** of scintillator elements **14** are maintained in position with respect to each other using a retaining mechanism **18**, which in an example embodiment is a retainer disposed about the outermost of the scintillator elements **14** to maintain the relative positions of the scintillator elements with respect to each other. The plurality of arrays **12** are positioned on a single, continuous light guide **24**, which functions to optically couple the scintillator arrays to a plurality of photodetectors **26**. In accordance with the invention, light guide **24** is continuous over the entire area of the scintillation detector arrays **12** and the photodetectors **26**, without containing any cuts or slots as in the prior art. Because the light guide is fabricated as a single continuous member, the time and expense required to fabricate the light guide is minimized. The constitution and operation of the claimed invention is set forth at pages 11-13 of the specification, in paragraphs 0027 to 0032. In operation, scintillation photons such as gamma rays emitted from a patient who has been injected with a radiopharmaceutical would strike individual scintillator elements **14** within a particular array **12**, causing the emission of a flash of visible light from the element **14**, which light would enter the light guide **24** and be guided thereby to the optical detecting surface of a photodetector **26** (such as, e.g., a photomultiplier tube), where it would be converted into an electrical signal.

The invention of independent claim 15 is substantially similar to the claimed invention of claim1, further including an air gap defined between adjacent ones of the scintillator elements. This is disclosed in the specification as air gap **16** shown in Fig. 2 and described at page 12, paragraph 0031 of the written description.

## GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

This appeal presents the following issues for review by the Board:

1) Whether claims 1-5, 13, 15, 16 and 19 are unpatentable under 35 U.S.C. § 102(b) as being anticipated by Uchida et al., U.S. Patent No. 5,091,650 ("Uchida"), and are properly rejected on that basis;

2) Whether claims 6, 7, 12, 14, 18 and 20 are unpatentable under 35 U.S.C. § 103(a) as being obvious over Uchida in view of Ryuo et al., U.S. Patent No. 5,227,634 ("Ryuo"), and

3) Whether claims 8-11 are unpatentable under 35 U.S.C. § 103(a) as being obvious over Uchida in view of Ryuo and further in view of Cherry et al., U.S. Patent No. 6,552,348 ("Cherry").

## ARGUMENT

### The Rejection of Claims 1-5, 13, 15, 16 and 19 Is Improper

The rejection of claims 1-5, 13, 15, 16 and 19 under 35 U.S.C. § 102(b) is improper and should be reversed. Claim 1 is directed to a detector array having a plurality of MxN arrays of scintillator elements, a mechanism for maintaining a relative position of each scintillator element in each of the arrays, a plurality of photodetectors, and a single continuous light guide disposed between the scintillator element arrays and the photodetectors.

Uchida fails to disclose a plurality of arrays of scintillator elements disposed on a single continuous light guide, or a mechanism for maintaining a relative position of each scintillator element in each of the arrays, as set forth in claims 1 and 15. Instead, Uchida discloses in Fig. 3 a single array of scintillators $1_{11}$ - $1_{44}$ that is positioned over a light guide 5 and a pair of photomultiplier tubes $2_1$-$2_2$. Indeed, the Office action itself accurately describes Uchida as disclosing in Fig. 3 "a detector array" (emphasis added). Final rejection at page 2. However, the detector array clearly does not comprise a plurality of MxN arrays as claimed. As disclosed by Uchida, "[t]he radiation detector as shown in Fig. 3 includes a scintillator array comprising plural scintillators." Col. 2, lines 67-68. A light guide 5 is sandwiched between the array and photomultiplier tubes. Col. 3, lines 2-4. In contrast, according to the present invention as disclosed and claimed, a single continuous light guide 24 is used to support a plurality of scintillator arrays 12, as shown in Figs. 1, 2 and 4 of the application. There is no basis in Uchida from which one of ordinary skill in the art would understand or interpret the single array $1_{11}$ - $1_{44}$ as constituting "a plurality of MxN arrays of scintillator elements where "M" and "N" are independently selectable and where "M" and "N" are at least two as set forth in claims 1 and 15. There is no disclosure or suggestion in Uchida that any four elements of the single array may be considered as a separate array, or that the number of row elements and column elements may be independently selectable as claimed.

An array is further defined by the claimed mechanism for maintaining relative position of each scintillator element with respect to each other in each of the plurality of arrays, as disclosed by scintillator element retainer mechanisms 18 shown in Figs. 1, 2 and 4. In other words, according to the array as defined in the specification in conjunction with the positioning mechanism, an array would be recognized as an indivisible unit or module, such as indeed illustrated in the application as array **12**. As such, it is clear that the single scintillator array shown by Uchida would not be construed by those having skill in the art as comprising a plurality of arrays as claimed.

Additionally, the final rejection has failed to make a *prima facie* showing of anticipation with respect to the claimed scintillator element position maintaining mechanism. The Office action acknowledges the absence of any such disclosure in

Uchida by improperly alleging that such a mechanism "is inherently included" in Uchida. However, to establish inherency, the extrinsic evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. In re Robertson, 169 F.3d 743, 49 USPQ2d 1949 (Fed. Cir. 1999). Inherency may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient. Id. (quoting In re Oelrich, 666 F.2d 578, 581, 212 USPQ 323, 326 (CCPA 1981).

Here, the Office action has introduced no extrinsic evidence that would establish that a "position maintaining mechanism," as properly construed in light of the specification, is necessarily present in the Uchida array, or that it would be so recognized by those skilled in the art. Consequently, no *prima facie* showing of anticipation has been made.

In addition to the position maintaining mechanism as set forth in claim 1, independent claim 15 is directed to a detector array with an air gap defined between adjacent scintillator elements of an MxN array. Uchida fails to disclose such a detector array. The Office action improperly cites to col. 5, lines 15-25 of Uchida as disclosing the use of an air gap. The cited passage however relates to the model of Fig. 4(C) for use with detector embodiments as shown in Figs. 5-7, while the Office action relies on the "conventional" detector shown in Fig. 3 for the other limitations of the claim. This is improper as anticipation requires that all of the elements of the claimed invention be identically shown in a single prior art reference and arranged as in the claim under review. In re Bond, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990).

Additionally, claim 2 requires that each of the side surfaces of the scintillator elements is optimized to a selected degree to define a selected light collection efficiency. This is described in the specification at page 15, paragraph 0041. Uchida discloses no such optimization, and the final rejection has failed to make out a *prima facie* showing of unpatentability of claim 2.

Uchida further fails to disclose the plurality of reflective light partitions set forth in claim 3 (see page page 13, paragraph 0033, to page 14, paragraph 0036).
For at least these reasons, this ground of rejection is improper and should be reversed.

## The Rejection of Claims 6, 7, 12, 14, 18 and 20 Is Improper

The final rejection proposes to add the disclosure of Ryuo to the disclosure of Uchida to reject claims 6, 7, 12, 14, 18 and 20, relying on Ryuo for alleged teaching of reflective films. Ryuo, however, does not disclose the limitations missing from Uchida with respect to the invention set forth in claims 1 and 15 and therefore no combination of Uchida with Ryuo et al. could result in the invention as set forth in these claims.

Additionally, the final rejection has failed to show that it would have been obvious to one of ordinary skill in the art to have modified Uchida as proposed. There must be identified some teaching, suggestion or motivation in the prior art for making such a modification, which has not been shown by the final rejection. Accordingly, this ground of rejection is improper and should be reversed.

## The Rejection of Claims 8-11 Is Improper

The final rejection proposes to add the disclosure of Cherry to the proposed combination of Uchida and Ryuo to reject claims 8-11, relying on Cherry for alleged teaching of “a grid array (18) for securing the scintillator array (4).” Cherry, however, also fails to disclose the limitations missing from Uchida with respect to the invention set forth in claims 1 and 15 and therefore no combination of Uchida and Ryuo with Cherry could result in the invention as set forth in these claims.

Additionally, the final rejection has failed to show that it would have been obvious to one of ordinary skill in the art to have modified Uchida as proposed. There must be identified some teaching, suggestion or motivation in the prior art for making such a modification, which has not been shown by the final rejection. In particular, the final rejection has failed make any showing of any problem recognized in the Uchida array from which one of ordinary skill in the art would have been motivated to modify Uchida “by supplying a grid array taught by Cherry” as alleged in the final rejection. In particular, there is no showing of record that those skilled in the art recognized any need for “preventing displacements of the components” of Uchida as alleged in the final rejection. To the contrary, the only suggestion for making such a modification comes from the present application. Accordingly, this ground of rejection is improper and should be reversed.

## CONCLUSION

In view of the foregoing, claims 1-16 and 18-20 are submitted to be directed to a new and unobvious detector array for use in association with an imaging device, which is not taught by the prior art. The Honorable Board is respectfully requested to reverse all grounds of rejection and to direct the passage of this application to issue.

Please charge any fee or credit any overpayment pursuant to 37 CFR 1.16 or 1.17 to Novak Druce Deposit Account No. 14-1437.

Respectfully submitted,

Novak, Druce, DeLuca + Quigg LLP

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## CLAIMS APPENDIX

1. A detector array for use in association with an imaging device, said detector array comprising:

a plurality of MxN arrays of scintillator elements where "M" and "N" are independently selectable and where "M" and "N" are at least two;

a mechanism for maintaining a relative position of each scintillator element in each of said plurality of MxN arrays of scintillator elements with respect to each other of said scintillator elements in each of said plurality of MxN arrays;

a plurality of photodetectors, said plurality of MxN arrays of scintillator elements being optically coupled to said plurality of photodetectors; and

a single continuous light guide disposed between said plurality of MxN arrays of scintillator elements and said plurality of photodetectors, said continuous light guide defining no discontinuities including cuts and slots.

2. The detector array of claim 1 wherein each of said scintillator elements defines a top surface, a bottom surface, and a plurality of side surfaces, and wherein each of said plurality of side surfaces is optimized to a selected degree to define a selected light collection efficiency and to control light sharing between said scintillator elements.

3. The detector array of claim 1 further comprising a plurality of reflective light partitions interposed between selected ones of said scintillator elements in at least one of said plurality of MxN arrays, at least one of said plurality of reflective light partitions defining a first height, and at least one of said plurality of reflective light partitions defining a second height.

4. The detector array of claim 3 wherein an air gap is defined between adjacent selected ones of said scintillator elements in at least one of said plurality of MxN arrays.

5. The detector array of claim 4 wherein said air gap is defined between scintillator elements between which no ~~said~~ reflective light partition is positioned.

6. The detector array of claim 3 wherein said plurality of reflective light partitions is fabricated from a material selected from the group consisting of at least reflective powders, plastics, paints, polyvinyl alcohol, ceramics, and films.

7. The detector array of claim 6 wherein said plurality of reflective light partitions is fabricated from film, said film being adhered to one side of an adjacent pair of said selected scintillator elements, and an air gap being defined between said film and an opposing side of said adjacent pair of said selected scintillator elements.

8. The detector array of claim 6 further comprising a grid array defined by said mechanism for maintaining a relative position of each of said scintillator elements in each of said plurality of MxN arrays of scintillator elements with respect to each other of said scintillator elements and said plurality of reflective light partitions, said grid array defining a plurality of scintillator element cells adapted to receive said array of scintillator elements, said grid array being fabricated from a material selected to maximize light reflection at a wavelength particular to said scintillator elements.

9. The detector array of claim 8 wherein said at least one array of scintillator elements are received within each of said scintillator element cells without a binding agent, and an air gap being defined between each said scintillator element and a side wall of said scintillator element cell.

10. The detector array of claim 8 wherein said grid array is fabricated from at least one component selected from the group consisting of at least: reflective powders, plastics,

paints, ceramics, titanium dioxide, barium sulfate, silicon dioxide, calcium carbonate, aluminum oxide, magnesium oxide, zinc oxide, zirconium oxide, talcum, alumina, Lumirror®, Teflon®, calcium fluoride, silica gel, polyvinyl alcohol, and films.

11. The detector array of claim 10 wherein said grid array is fabricated from a composition including 20% titanium dioxide ($TiO_2$), 2% Teflon®, 0.2% optical brightener, and polypropylene.

12. The detector array of claim 1 wherein said mechanism is a bonding agent for bonding scintillator elements to at least one of said photodetectors.

13. The detector array of claim 1 wherein said plurality of photodetectors is selected from the group consisting of at least a photomultiplier tube, a position sensitive photomultiplier tube, an avalanche photodiode, a pin diode, a CCD, and a solid state detector.

14. The detector array of claim 1 wherein said mechanism is a bonding agent for bonding each of said scintillator elements to said light guide.

15. A detector array for use in association with an imaging device, said detector array comprising:

at least one MxN array of scintillator elements where "M" and "N" are independently selectable, and where "M" and "N" are at least two;

an air gap defined between adjacent ones of said scintillator elements;

a mechanism for maintaining a relative position of each of said scintillator elements in said at least one MxN array of scintillator elements with respect to each other of said scintillator elements;

at least one photodetector, said array of scintillator elements being optically coupled to said at least one photodetector; and

a continuous light guide disposed between said at least one array of scintillator elements and said at least one photodetector, said continuous light guide defining no discontinuities including cuts and slots.

16. The detector array of claim 15 wherein each of said scintillator elements in said at least one MxN array of scintillator elements defines a top surface, a bottom surface, and a plurality of side surfaces, and wherein each of said plurality of side surfaces is optimized to a selected degree to define a selected light collection efficiency and to control light sharing between said scintillator elements.

17. (Cancelled)

18. The detector array of claim 15 wherein said mechanism for maintaining a relative position of each of said scintillator elements in said at least one array of scintillator elements with respect to each other of said scintillator elements is a bonding agent for bonding each of said scintillator elements to said at least one photodetector.

19. The detector array of claim 15 wherein said at least one photodetector is selected from the group consisting of at least a photomultiplier tube, a position sensitive photomultiplier tube, an avalanche photodiode, a pin diode, a CCD, and a solid state detector.

20. The detector array of claim 15 wherein said mechanism for maintaining a relative position of each of said scintillator elements of said at least one array of scintillator elements with respect to each other of said scintillator elements is a bonding agent for bonding each of said scintillator elements to said light guide.

## EVIDENCE APPENDIX

None

## RELATED PROCEEDINGS APPENDIX

None